

## Effect Of Local Bentonite Powder On The Growth, Development And Yield Of Cotton Variety S-01 Under Moderately Saline Grassland Gray Soils

**Hamraev Fayzulla Khidirovich**

associate professor, Ph.D.

**Safarova Dilshoda Ubaidulla's daughter**

is a graduate student, Navoi State University of Mining and Technologies, Department of Agronomy.

### Abstract

In this article, the influence of local bentonite powder on the growth and development and productivity of the regional S-01 cotton variety in the conditions of moderately saline meadow gray soils of Navoi region is studied, the obtained results are analyzed and fully explained.

**Key words:** Agroruda, bentonet, shelling, seed feeding, resource efficient technology, irrigation, cotton, productivity.

**Enter.** The size of irrigated farming areas in the republic is 8-9% of the total land area, and these existing irrigated lands are the gold fund of the republic.

Among them, Uzbekistan has consumed 169% of its water reserves and has reached a critical level in relation to water resources. Problems of water supply, water scarcity, water pollution and overuse in agriculture need to be solved urgently. As we confront the negative impacts of climate change, it is imperative that food systems are transformed and stabilized first.

In order to provide stable and guaranteed supply of water to all sectors of the population and economy in our country, large-scale works are being carried out on the development of irrigation, the improvement of the water management infrastructure and the reclamation of irrigated lands, and the efficient and rational use of land and water resources.

At the same time, due to global climate change, increasing population and year-by-year demand for water, increasing water resource shortage may be one of the main limiting factors for the future development of the country.

The situation requires the scientific justification of the ways of rational use of land and water resources, the development

of technologies for the effective use of land and water resources, and making proposals and recommendations for production, based on the different soil and climatic conditions of the republic, which preserve and increase soil fertility, and ensure the demand of the population for food products.

**Physical and chemical composition of soils:** The experimental field is located in the Karmana district of the Navoi region, the soil is gray loam, the water table is in the range of 2.5-3.0 m, and it rises at different times during the season.

Also, when the soil of the experimental field was analyzed before the experiment, the amount of humus in the 0-30 cm layer of the soil was 1.12%, total nitrogen - 0.13%, total phosphorus - 0.23%, nitrate nitrogen - 14.1 mg/kg, mobile phosphorus - 21.3 mg/kg, and exchangeable potassium content was 198 mg/kg, while the amount in the 30-50 cm layer of the soil was respectively It was found to be 0.78%, 0.06%, 0.15%, 7.6 mg/kg, 16.1 mg/kg and 1.72 mg/kg. According to the results of the analysis, the amount of these ions does not have a harmful effect due to the correct use of agrotechnical measures in cotton care (Table 1).

When the level of salinity of the soil of the field where the scientific research work was

carried out was studied according to the genetic layers, it was observed that it was weakly saline according to the amount of

dry residue and chlorine in the soil, and as a result of seasonal irrigation, it decreased somewhat after irrigation.

**Table 1. Agrochemical soil conditions of experimental field soils**

Soil layer, cm	Humus, %	Total nitrogen, %	Total phosphorus, %	Nitrate nitrogen, mg/kg	Mobile phosphorus, mg/kg	Exchangeable potassium, mg/kg
0-30	1,12	0,13	0,23	14,1	21,3	198
30-50	0,78	0,06	0,15	7,6	16,1	172

The amount of salt in the field soil definitely affects the germination and growth of the seed. In the experiment, seed germination and growth of seed encapsulation with bentonite mud was observed. Despite having the same nutrient and salinity level of the soil, it was found that the germination of the seeds sown in normal and encapsulated manner was faster and more in all varieties.

From the results obtained from the soil analysis of the experimental fields, it can be concluded that the amount of nutrients in the soil was kept almost unchanged and the

soil fertility did not decrease due to the mineral fertilizers used every year.

**The system and methodology of the experiment:** To implement the planned tasks, the field experiment was conducted in the conditions of light gray soil prone to salinity.

Experiments on the use of bentonite clay powder in cotton care were conducted in 4 variants and 3 returns. Each return area is 666 m<sup>2</sup> (28.8 m wide x 23 m long), with a total experimental area of 0.2 ha (666 x 3).

**Table 2. Design of the experiment on the use of bentonite clay powder in cotton**

No	Options name	The rate of bentonite used in seed shelling, kg/t	Suspension composition	
			Urea, kg/ha	Bentonite, kg/ha
1	Control	-	5	-
2	Planted with bark	100	5	-
3	Planted under cover and fed with bentonite suspension from the leaf	100	5	1
4	Planted in the usual way and fed with bentonite suspension	-	5	1

All agrotechnological measures used for crop care in the experiment were carried out according to the recommendations

accepted for the study areas and PSUEAITI methodical manuals and methods.

In order to meet the nutrient requirements of cotton in the cotton field designated for

experiments, mineral fertilizers were used: ammonium nitrate -  $\text{NH}_4\text{NO}_3$  (N -  $34.6 \pm 0.5\%$ ), ammophos -  $\text{NH}_4\text{H}_2\text{PO}_4$  (N - 11-12%,  $\text{P}_2\text{O}_5$  - 46%) and 40% potassium salt, and urea -  $\text{CO}(\text{NH}_2)_2$  (N - 46%) mineral in foliar feeding. fertilizers were used.

In case of cotton varieties, seeding in shell had a specific effect on their germination and healthy development of existing seedlings. When observations were made 6 days after the date of seed sowing, the number of germinated seedlings was 68-70% in the variants of the S-01 variety planted in the normal way, while in the case of the shell-planted variant, these indicators were 84%. The same indicators, when

observed 3-5 days after the start of germination, were 92% in conventionally planted options, and 97% in shelled options (Table 3). Since the seeds were planted in a shell with bentonite clay powder, it had a unique positive effect on their germination in the spring and the healthy and vigorous growth of the seedlings. The reason for this is the richness of microelements in the composition of bentonite clay and its sorption properties.

**Table 3. Effect of seed coating with bentonite clay powder on cotton germination, %.**

No	Options	S-01 Date of planting: 14.04.22.		
		20.04	22.04	23.04
1	Control	68	89	92
2	Planted with bark	84	96	97
3	Planted with bark + bentonite suspension	83	95	97
4	Bentonite suspension	70	88	91

Feeding of cotton with bentonite and mineral fertilizer suspension during the growing season caused healthy development of existing seedlings. At the beginning of the season, there were an average of 83,100 seedlings in the control variant of the S-01 variety in the experimental field, but by the end of the period of operation, as a result of various unfavorable climatic conditions and other measures, a decrease in the number of seedlings was observed by 4,400 units.

In the options where bentonite clay powder was used only for seed shelling, the number of seedlings decreased from 84,500 seedlings at the beginning of the operation period to 3,300 units at the end of the operation period.

Among the options studied in the experimental field during the operation period, the best preservation of seedlings was observed in the options that used shelling from bentonite clay powder and urea in foliar feeding, that is, the thickness of seedlings decreased by 2, 1 thousand pieces (Table 4).

**Table 4. Effect of application of bentonite clay powder in shelling and foliar feeding on seedling thickness of cotton (at the beginning and end of the validity period)**

No	Options	S-01	
		the number of seedlings at the beginning of the validity period, thousand/ha	the number of seedlings at the end of the validity period, thousand/ha
1	Control	93.1	88,7
2	Planted with bark	94.6	91,3
3	Planted with bark + bentonite suspension	94.5	92,5
4	Bentonite suspension	92.9	91,9

It can be said that crusting with bentonite clay powder and using a suspension with urea in foliar feeding caused a reduction in the mortality of existing seedlings. The use of bentonite clay powder in foliar feeding during the growing season helps the plant in stressful situations in various adverse environmental conditions. The fact that bentonite clay retains water for a long time, forms a thin film when sprinkled on the surface of the leaf, protects the water from excessive evaporation from the surface of the leaf, and also prevents the evaporation of the mineral fertilizer sprinkled with it and causes it to be fully absorbed, has a positive effect on the development of the plant. Significant changes in cotton yield were observed in the methods used in our experiments: shelling with bentonite clay

powder and mixing bentonite clay powder with mineral fertilizer suspension during foliar feeding.

In the S-01 variety, the yield index was 38 t/ha in the control variant, 41.9 in the case of the seed sown in husks, 45.2 in the case of the seed sown in husks and foliar feeding with bentonite+urea suspension 3 times, and 42.5 t/ha in the option of foliar feeding only with bentonite+urea suspension 3 times. This, in turn, indicates that 3.9, 7.2 and 4.5 t/ha or 10.2, 18.9 and 11.8% additional yield was obtained, respectively (Table 5).

**Table 5. Effect of application of bentonite clay powder in shelling and foliar feeding on cotton yield**

T/r	Options	Productivity, ts/ha	Additional yield compared to the control, ts/ha	Additional yield compared to control, %
S-01				
1	Control	38,0	-	-
2	Planted with bark	41,9	3,9	10,2

3	Planted with bark + bentonite suspension	45,2	7,2	18,9
4	Bentonite suspension	42,5	4,5	11,8

In conclusion, it can be said that the above-mentioned properties of bentonite clay gave positive results in cotton yield in the experiments. It was found that it is possible to achieve high productivity using bentonite clays even with irrigation 3 times instead of 4 times during the season, i.e. saving up to 700-1000 m<sup>3</sup> of irrigation water.

**Conclusions:** 1. In the experimental field of using bentonite clay powder in the S-01 cotton variety, the highest rate of 97% was observed in the shell-planted variant. Among the options studied during the implementation period, the best preservation of seedlings was observed in the options that used shelling from bentonite clay powder and suspension with urea in foliar feeding, that is, seedling thickness was 82.5%.

2. The highest cotton yield of 45.2 t/ha was obtained in the variant of S-01 variety, in which the seed was sown with a shell and fed 3 times with bentonite + urea suspension. This, in turn, indicates an additional yield of 7.2 tons/ha or 18.9%.

3. Saving 700-1000 m<sup>3</sup> of irrigation water was achieved in the care of cotton in the experimental area irrigated during the season.

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